Application Note AN-T-032

Sulfide and hydrogen sulfide in water

Inexpensive determination by potentiometric titration

Sulfides are a commonly found class of minerals. Inorganic sulfides are used in the extraction of metals such as copper, iron, lead, zinc, mercury, and the metalloid arsenic due to their high abundance in sulfide mineral ore. The sulfides are separated from the metals and accumulate in the wastewater effluent. They are malodorous and cause corrosion problems in wastewater treatment facilities (especially concerning concrete and iron). In acidic water, sulfides react to form hydrogen sulfides, which are extremely toxic even at low levels.

In addition, both sulfides and hydrogen sulfides are naturally present in thermal springs and could poison the bathers through evaporation. Therefore, it is important to monitor the amount of sulfides and hydrogen sulfides in the water.

This application note describes the trace level determination of sulfides and hydrogen sulfides in water in by potentiometric titration.

SAMPLE AND SAMPLE PREPARATION

This application is demonstrated on spiked groundwater samples. The water is spiked with sodium sulfide.

Immediately after the sample is bottled, it is preserved with sodium hydroxide, to prevent the sulfides from forming volatile hydrogen sulfides.

EXPERIMENTAL

This analysis is carried out on an OMNIS Advanced Titrator equipped with an Ag Titrode with an Ag_2S coating. The Ag_2S coating lowers the detection limit and ensures a fast response. Before the titration, the sample is purged with nitrogen gas in order to remove any remaining oxygen. The samples are then titrated with silver nitrate until after the equivalence point.

Figure 1. OMNIS Advanced Titrator equipped with an Ag Titrode with Ag2S coating for the determination of sulfides and hydrogen sulfides in water samples.

RESULTS

Reproducible results are obtained in spite of the low concentration of sulfide in the sample and low titrant concentration. For the tested groundwater, a hydrogen sulfide content of 0.31 mg/L (n = 3, SD(abs) = 0.01 mg/L, SD(rel) = 1.91%) is obtained.

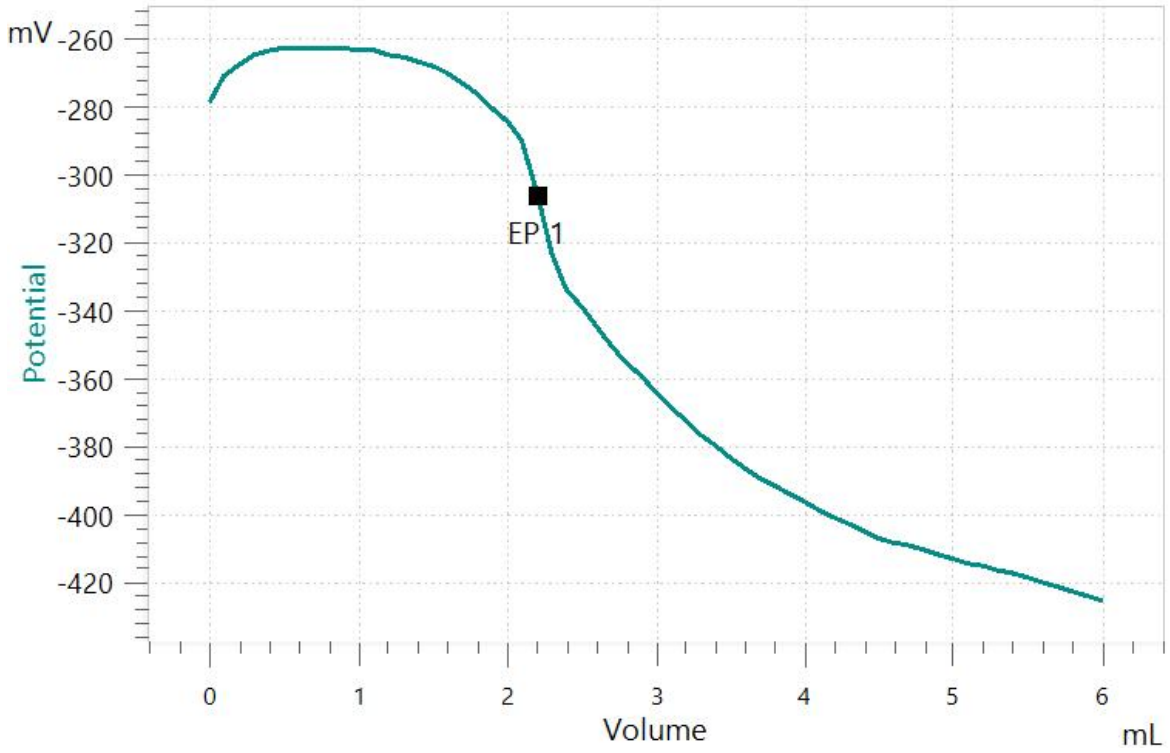

Figure 2. Exemplary titration curve of the hydrogen sulfides determination.

CONCLUSION

Titration is an inexpensive method to determine sulfides and hydrogen sulfides in water. The method can measure a hydrogen sulfide content as low as 0.31 mg/L. To measure higher hydrogen sulfide levels, the concentration of the titrant can be increased. Therefore, the samples do not need to be diluted, which could falsify the results. This makes titration a versatile method covering a large concentration range in comparison to other methods such as photometry.

Using an Ag Titrode with Ag_2S coating ensures a fast response time and a low detection limit. This electrode is additionally maintenance-free using a pH glass membrane as reference electrode. It can be simply stored in distilled water.

Internal reference: AW TI CH1-1300-032020

CONTACT

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CONFIGURATION

OMNIS Advanced Titrator

新型、模式位分析 OMNIS Titrator 滴定,于独立行或作 OMNIS 滴定系的核心元件行,用于使用 OMNIS Sample Robot 行点和等当点滴定(一/)。由于采用 3S 瓶配器技,理化学品从未像在一安全。可以使用量模和量管元自由配置滴定,并在需要展一台螺旋拌器。在需要可以通相的件功能可平行滴定升 OMNIS Advanced Titrator。

- 通算机或本地网控制
- 可以其他用或助溶液外接最多四个滴定模或加液模
- 螺旋拌器的接方式
- 可提供不同大小的量管:5、10、20 或 50 mL
- 采用 3S 技的瓶配器:安全理化学品,自生商的原始数据

量模式和件:

- 点定滴定:"Basic" 功能可
- 点和等当点滴定(一/):"Advanced" 功能可
- 点和等当点滴定(一/),包括平行滴定:"Professional" 功能可

dAg Titrode Ag2S

pH 玻璃膜的 OMNIS 用数字合式形,用作参比。具有硫化物 (Ag_2S) ,其用于高的敏度和更好的指示限。免用于 pH 恒定的滴定(硝酸滴定),例如:

- 化物、化物、化物
- 硫化物
- 硫化
- 硫醇
- 化物

存放在蒸水中。

dTrodes 可在 OMNIS Titratoren 上使用。